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ABSTRACT

This book of posttests is designed to accompany the Engine Tune-Up Service Student Guide for Unit 4, Secondary Circuit, available separately as CE 031 214. Focus of the posttests is testing and servicing the secondary ignition circuit. One multiple choice posttest is provided that covers the seven performance objectives contained in the unit. (No answer key is provided.) (YLB)

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ENGINE TUNE-UP SERVICE

Unit 4: Secondary Circuit

Posttests

Automotive Mechanics Curriculum

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CE 031 216

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POSTTEST

UNIT 4

Directions: Read the first question below carefully. After selecting your answer, record the answer on your answer sheet in the space provided.

Next, turn to the question listed in parentheses at the end of your answer. For example, if your choice says, "(go to #14)," you would answer question 14 next.

Each time you answer a question, be sure to write down on your answer sheet **both** the question number and your answer. Continue working through the test until you reach the end.

You will be jumping from question to question, and will not have to answer more than 30 questions.

DO NOT MARK ON THIS TEST.

1. **Situation:** You are working as a line mechanic at a local Chrysler-Plymouth dealership. For your first job of the day, you have been assigned to work on a 1972 Newport. The service manager has noted that the customer complains of hard starting, rough running, and poor gas mileage. The firing order for this vehicle is 1-8-4-3-6-5-7-2.

   You would now:

   a. Hook up the engine analyzer and scope (go to #20)
   b. Check the battery (go to #21)
   c. Check the contact points (go to #66)
   d. Check the contact point dwell (go to #76)
   e. Check the cylinder compression (go to #39)
   f. Perform a cylinder balance test (go to #74)
   g. Visually inspect the engine compartment (go to #33)
   h. Crank the engine (go to #29)
   i. Check the secondary wiring (go to #82)

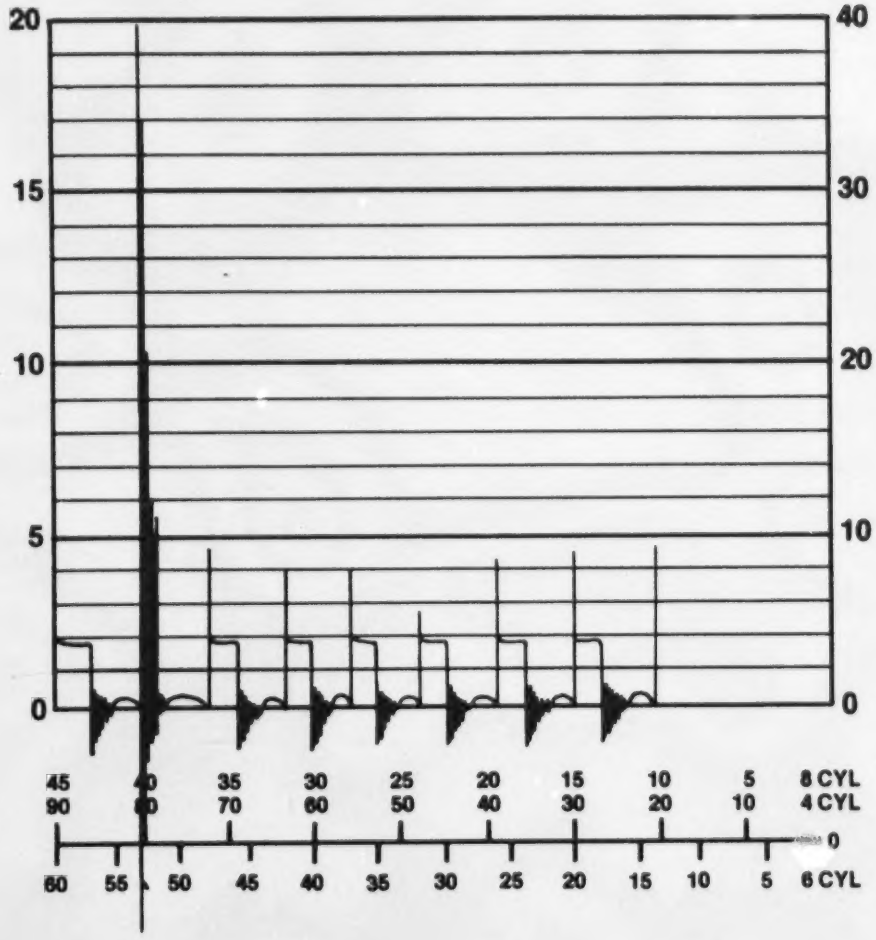
2. After installing spark plugs, you would:

   a. Check all secondary wiring (go to #40)
   b. Perform a cylinder leakage test (go to #47)
   c. Perform a cylinder power balance test (go to #107)
   d. Perform a cylinder compression test (go to #110)

3. If you were on an emergency road call, and were trying to service a car with the same symptoms as those in question 1, you would first check the:

   a. Ignition system (go to #115)
   b. Fuel system (go to #115)
   c. Emissions control system (go to #115)
   d. Charging system (go to #115)
   e. Cranking system (go to #115)

4. The following display pattern is shown on the engine analyzer:



You would now:

a. Replace spark plug #2 (go to #64)
b. Replace spark plug #8 (go to #75)
c. Replace spark plug wire #2 (go to #102)
d. Replace spark plug wire #8 (go to #3)
e. Check distributor cap and rotor (go to #40)
f. Check manufacturer's procedures for making a "snap load" test (go to #61)

5. Next you should:

a. Check the secondary wiring (go to #82)
b. Check contact point dwell (go to #76)
c. Perform a spark plug firing voltage test (go to #100)
d. Check the condition of the spark plugs (go to #97)
e. Perform a snap load test (go to #61)

6. Before attaching the cylinder leakage air hose to any cylinder, you must first make sure that the piston in that cylinder is at:
   a. BDC (go to #104)
   b. TDC (go to #104)
   c. 7 1/2° BTDC (go to #64)

7. Which of the following checks on engine performance would you first make with the oscilloscope?
   a. Snap load test (go to #38)
   b. Secondary ignition circuit resistance test (go to #32)
   c. Available coil voltage test (go to #79)
   d. Secondary circuit insulation test (go to #13)
   e. Spark plug firing voltage test (go to #100)

8. You are tightening the spark plugs with a torque wrench that is 18 inches (1 1/2 feet) in length. The manufacturer specifies torque of 30 ft-lbs. for the spark plugs. Therefore, you would tighten the spark plugs until the torque gauge reads:
   a. 15 ft-lbs. (go to #2)
   b. 20 ft-lbs. (go to #2)
   c. 30 ft-lbs. (go to #2)
   d. 45 ft-lbs. (go to #22)

9. Specific gravity readings are: 1.260, 1.260, 1.260, 1.260, 1.250, 1.260. You would next:
   a. Replace the battery (go to #75)
   b. Charge the battery (go to #40)
   c. Hook up the engine analyzer (go to #20)
   d. Visually inspect the engine compartment (go to #33)
   e. Crank the engine (go to #29)
   f. Check the secondary wiring (go to #82)

10. The engine hesitates, then accelerates as you snap the throttle. High RPM operation is also rough. You would now:
   a. Check the secondary wiring (go to #82)
   b. Hook up the engine analyzer (go to #20)
   c. Check the contact point dwell (go to #76)
   d. Visually inspect the engine compartment (go to #33)
   e. Perform a cylinder power balance test (go to #74)

11. The contact point gap measures .020''. Specifications for this vehicle are .016-.021''. Therefore, you would now:
   a. Increase the point gap (go to #109)
   b. Decrease the point gap (go to #23)
   c. Check point dwell (go to #76)
   d. Inspect the secondary wiring (go to #82)
   e. Hook up the engine analyzer (go to #20)
   f. Visually inspect the entire engine compartment (go to #33)

12. The engine starts normally, but runs rough at low and high idle. Next you would:
   a. Perform a cylinder power balance test (go to #107)
   b. Perform a compression test (go to #18)
   c. Remove spark plugs and check conditions (go to #73)
   d. Check distributor cap and rotor (go to #17)
   e. Check ignition spark timing (go to #65)

13. In order to perform a secondary circuit insulation test, you must:

a. Remove a spark plug wire (go to #81)
b. Remove and ground a spark plug wire (go to #37)
c. Remove the distributor cap (go to #42)
d. Remove the coil secondary lead from the distributor cap (go to #55)

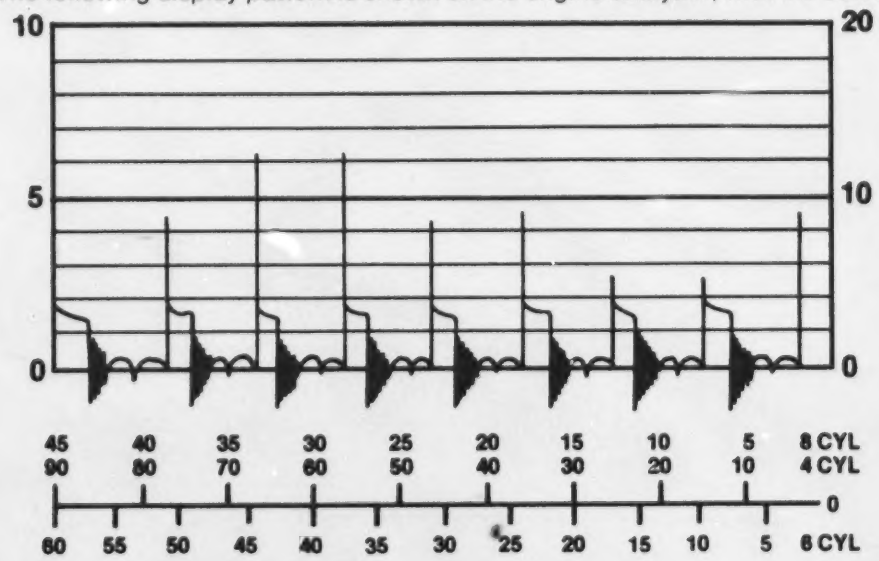
14. The distributor-to-coil secondary lead is 8 inches in length, and has a measured resistance of 4,000 ohms. Manufacturer gives no specifications in the technical service manual. You would now:

a. Replace the wire with a new one (go to #64)
b. Test the condenser capacity (go to #102)
c. Replace the coil (go to #40)
d. Reinstall the wire and check the condition of the contact points (go to#66)
e. Reinstall the wire and check the condition of the spark plugs (go to #73)

15. After examining the spark plugs, you decide to replace them with new ones. Next you would check:

a. Cylinder leakage (go to #21)
b. Cylinder power balance (go to #107)
c. Cylinder compression (go to #110)
d. Nothing: the car should be ready to go (go to #3)
e. Spark timing (go to #102)

16. The following display pattern is shown on the engine analyzer, with the 20KV scale selected:



You would next:

a. Replace the spark plug of the #2 cylinder (go to #75)
b. Replace the spark plug wire of the #2 cylinder (go to #3)
c. Repeat test on #6 cylinder (go to #102)
d. Repeat test on #4 cylinder (go to #68)
e. Repeat test on #7 cylinder (go to #41)

17. The distributor cap and rotor are in fair condition. There are no cracks in the cap, and terminals are not excessively worn. You would now:

a. Check cylinder compression (go to #110)
b. Perform a cylinder leakage test (go to #47)
c. Perform a cylinder power balance test (go to #107)
d. Tell the customer that his/her car is ready to go (go to #102)

18. In order to perform the "wet" compression test procedure, you need to:

a. Squirt about two ounces of solvent into a cylinder, and then take the compression reading (go to #40)
b. Squirt about two ounces of motor oil into a cylinder, and then take the compression reading (go to #83)
c. Squirt about two ounces of gasoline into a cylinder, and then take the compression reading (go to #75)
d. Squirt about two ounces of water into a cylinder, and then take the compression reading (go to #64)

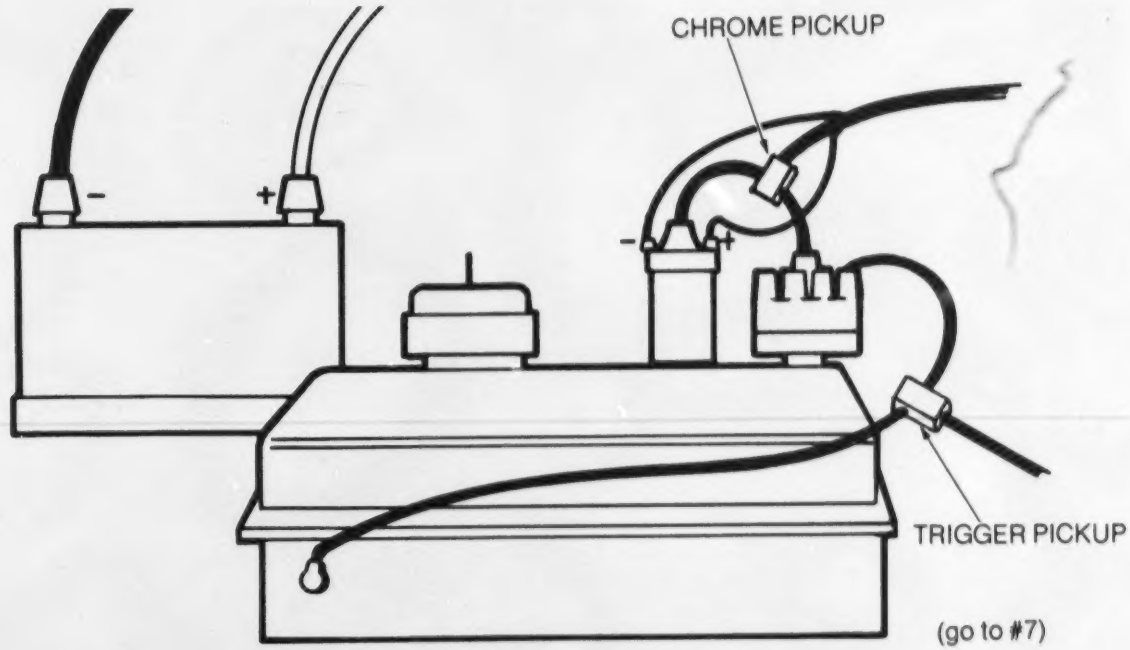
19. After properly hooking up the engine analyzer, you would next:

a. Short out all cylinders at one time, and note engine RPM change (go to #67)
b. Short out all cylinders at one time, and note spark timing change (go to #75)
c. Short out cylinders, one at a time, and note engine RPM increase (go to #67)
d. Short out cylinders, one at a time, and note engine RPM (go to #67)

20. Which of the following hookup arrangements would you use for attaching the analyzer leads to the vehicle?

a.
b.
c.

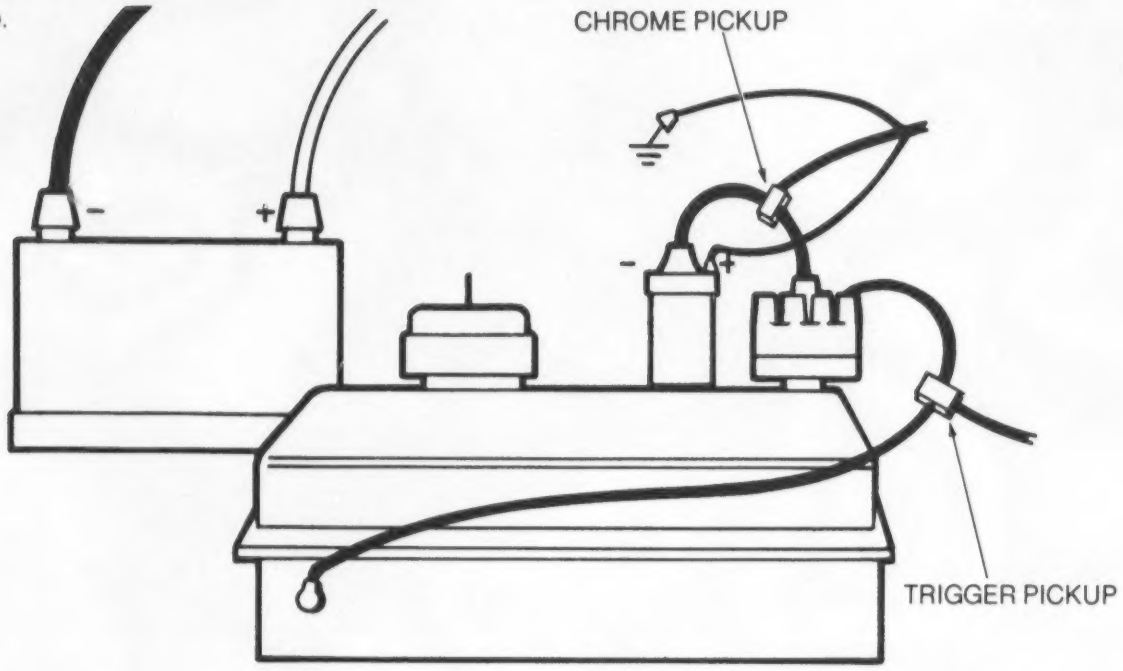
a.



(go to #7)

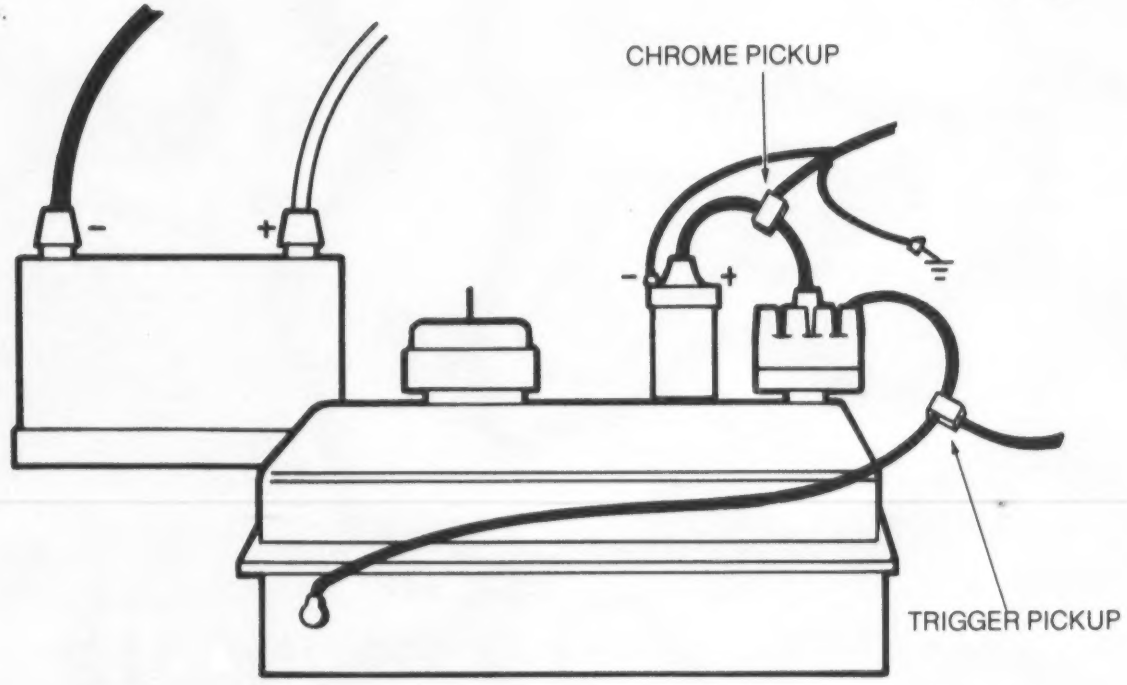
9

b.



(go to #42)

c.



(go to #42)

10

21. The battery case is dirty, but there is little corrosion around terminals. Electrolyte levels are okay. Cable clamps are tight and cables look good. Next you would:

a. Clean the battery (go to #101)
b. Check battery capacity (go to #77)
c. Check specific gravity (go to #9)
d. Check for battery drain (go to #56)
e. Crank the engine (go to #29)
f. Check cylinder compression (go to #39)
g. Visually inspect the rest of the engine compartment (go to #33)
h. Hook up engine analyzer (go to #20)

22. After installing the spark plugs, you should next:

a. Perform a secondary circuit insulation test (go to #115)
b. Check the secondary circuit wiring (go to #115)
c. Check the contact point dwell (go to #115)
d. Perform a cylinder power balance test (go to #115)
e. Crank the engine (go to #115)
f. Check the distributor cap and rotor (go to #115)

23. Decreasing the ignition contact point gap also causes:

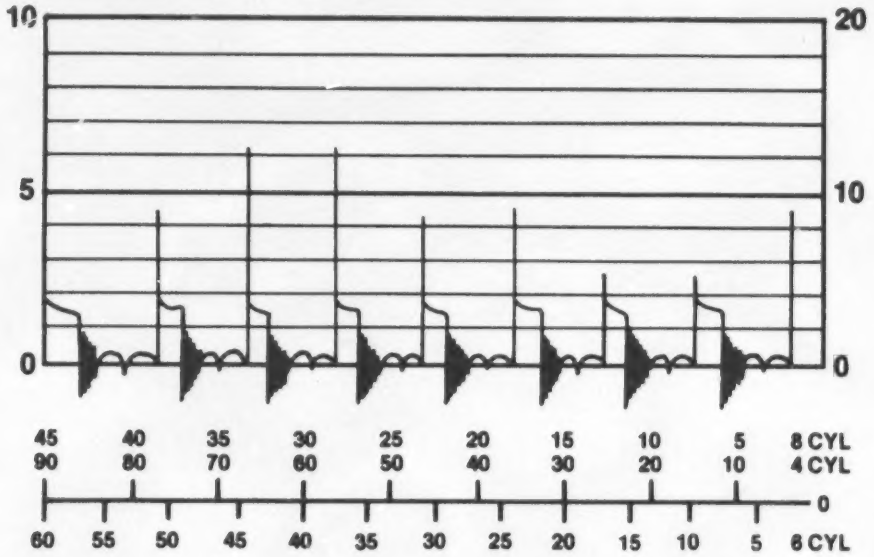
a. An increase in condenser energy capacity (go to #75)
b. A decrease in condenser energy capacity (go to #75)
c. An increase in ignition dwell angle (go to #75)
d. A decrease in ignition dwell angle (go to #75)

24. Spark plug wires to cylinders #3 and #4 are each 24 inches long. No specifications for resistance are given in the technical service manual. Wires are dirty, not oily, and appear to be tightly connected. Next you should:

a. Check the distributor cap and rotor (go to #50)
b. Check compression in #6 cylinder (go to #75)
c. Check resistance of the two spark plug wires (go to #103)
d. Check the spark plugs in cylinder #3 and #4 (go to #69)

25. No pattern is obtained on the engine analyzer. You should now:

a. Check contact point dwell (go to #64)
b. Check the scope manufacturer's directions for checking ignition system (go to #57)
c. Replace all secondary circuit wiring (go to #75)
d. Repeat test, using raster pattern (go to #40)

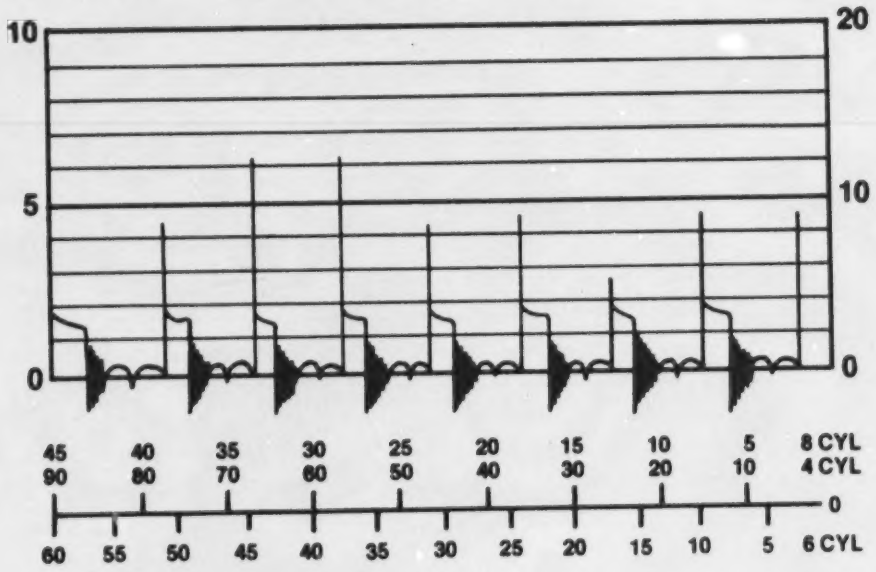


26. Coil primary resistance is measured as less than 2 ohms, secondary resistance is measured as about 10,000 ohms. Specifications for this particular model are: (at 70-80°F) primary 1.6-1.79 ohms, secondary 9,400-11,700 ohms.

You would next:

a. Perform a snap load test (go to #61)
b. Check contact point dwell (go to #76)
c. Replace the coil (go to #5)
d. Check secondary circuit wiring (go to #82)
e. Check the condition of the spark plugs (go to #97)

27. The following display pattern is shown on the engine analyzer:



Next you would:

a. Check the distributor cap and rotor (go to #75)
b. Replace all secondary wiring (go to #92)
c. Replace all spark plugs (go to #84)
d. Perform a compression test on all cylinders (go to #39)

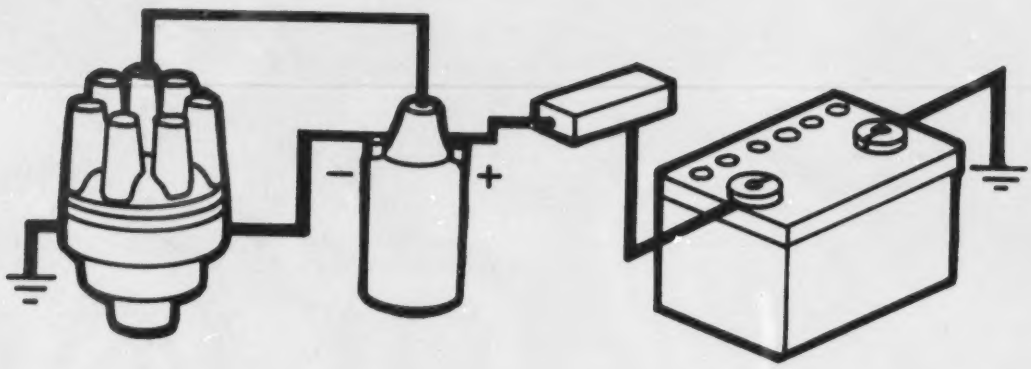
28. You have tested the #1 cylinder. The simplest method for insuring that pistons in other cylinders are in proper position is to:

a. Measure piston position with a screwdriver blade (go to #58)
b. Refer to the timing marks on or near the harmonic balancer (go to #58)
c. Refer to the TDC position indicator (go to #58)
d. Use the air whistle for each remaining cylinder (go to #58)

29. Engine cranks normally, but takes more than a minute and several attempts to start. Curb idle and high idle are rough. Next you would:

a. "Snap" the throttle a few times (go to #10)
b. Check the contact points (go to #66)
c. Perform a compression test (go to #39)
d. Hook up the engine analyzer (go to #20)
e. Check contact point dwell (go to #76)
f. Remove and check the condition of the spark plugs (go to #73)

30. Coil is hooked up as shown below:



You would next:

a. Reverse coil primary connections (go to #40)
b. Check spark plug firing voltage (go to #100)
c. Check coil primary and secondary resistance (go to #26)
d. Check contact point dwell (go to #76)
e. Replace the coil (go to #5)

31. Resistance of secondary wiring is as follows:

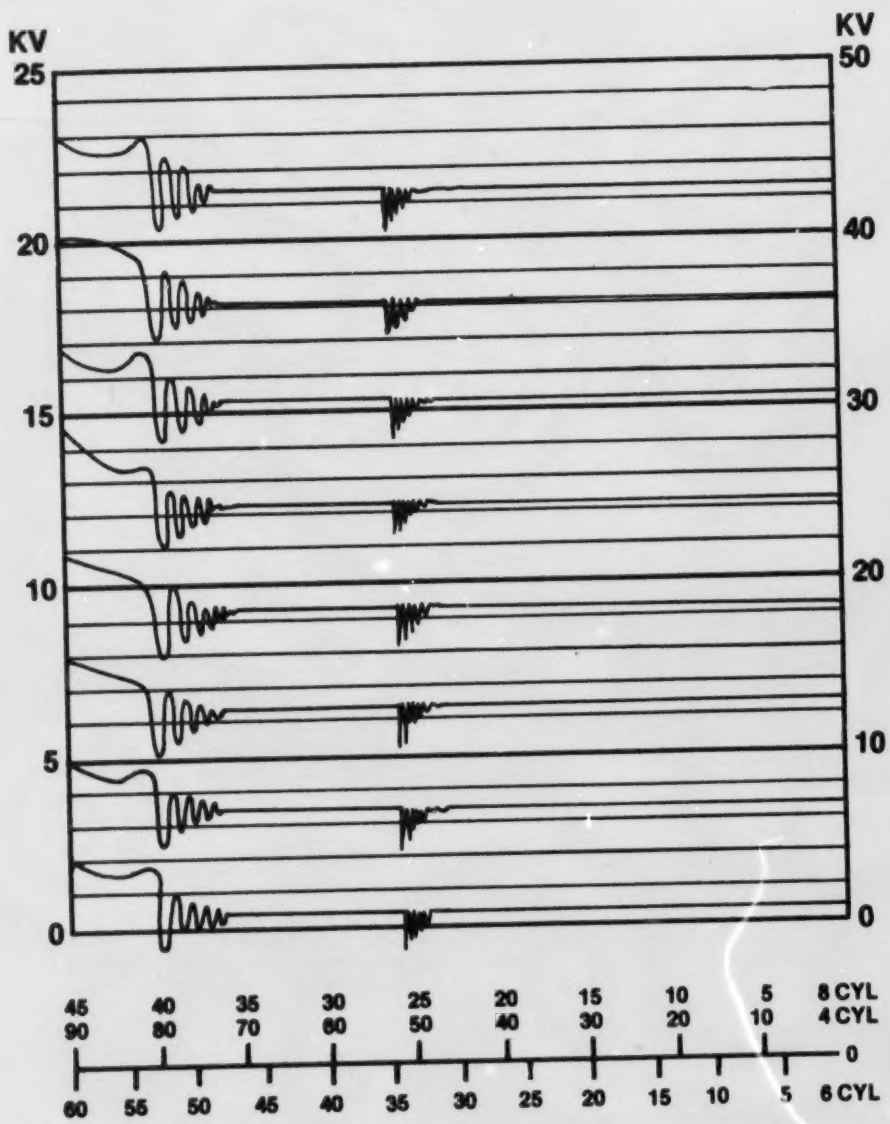
WIRE:	**#1 spark plug**	**#2 spark plug**	**#5 spark plug**	**#6 spark plug**
Length: (in inches)	20	20	28	28
RESISTANCE: (in ohms)	7,000	7,000	8,000	10,000

WIRE:	**#7 spark plug**	**#8 spark plug**	**Coil-to-distributor cable**
LENGTH: (in inches)	32	32	8
RESISTANCE: (in ohms)	9,000	10,000	4,000

You would now:

a. Replace all secondary wiring (go to #113)
b. Reinstall all secondary wiring (go to #3)
c. Replace spark plug wires leading to cylinders #8 and #4 (go to #113)
d. Inspect the distributor cap and rotor (go to #75)

32. On the engine analyzer, the following secondary raster pattern is shown:



You would next:

a. Perform an available coil voltage test (go to #79)
b. Check the distributor cap and rotor for wear (go to #50)
c. Perform a spark plug firing voltage test (go to #100)
d. Check spark plugs (go to #97)
e. Check spark plug wires (go to #82)
f. Check coil polarity (go to #30)

15

33. The engine compartment is pretty dirty, but all the parts appear to be in good condition. No loose wires, belts, or hoses are showing. Next you would:

a. Crank the engine (go to #29)
b. Check the secondary circuit wiring (go to #82)
c. Check the contact points (go to #66)
d. Check the contact point dwell (go to #76)
e. Check cylinder power balance (go to #72)
f. Hook up engine analyzer (go to #20)

34. After adjusting dwell angle, you should next:

a. Test the condenser (go to #86)
b. Check spark timing and adjust as necessary (go to #40)
c. Check engine idle mixture and adjust as necessary (go to #75)
d. Check the contact point gap with a feeler gauge (go to #64)

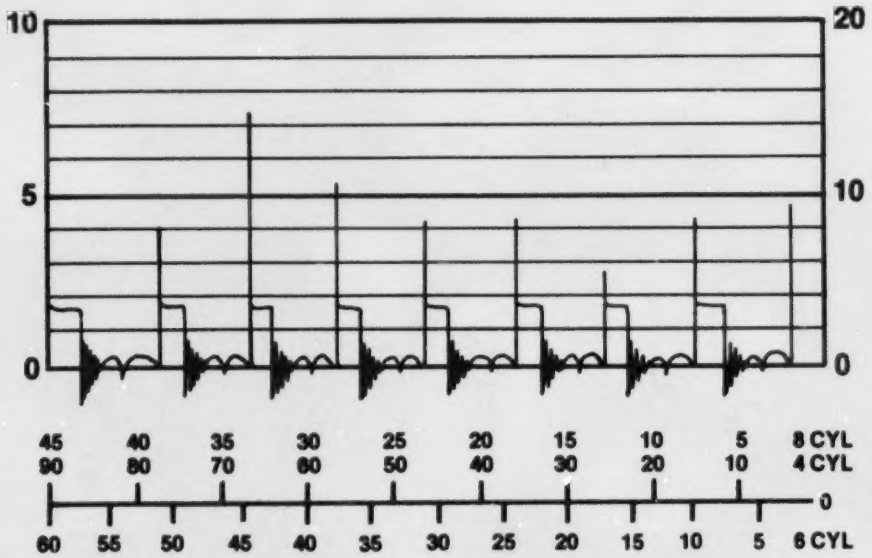
35. The results of the wet compression test readings are:

CYLINDER	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
COMPRESSION (in pounds)	65	75	65	55	80	60	50	60

These results are a good indication that:

a. There is no mechanical fault in the engine (go to #102)
b. The piston rings have excessive wear (go to #3)
c. The cylinder walls are worn thin (go to #64)
d. The valves are worn (go to #87)
e. The spark timing is not properly set (go to #75)
f. Proper air flow in the intake manifold is being restricted or blocked (go to #40)

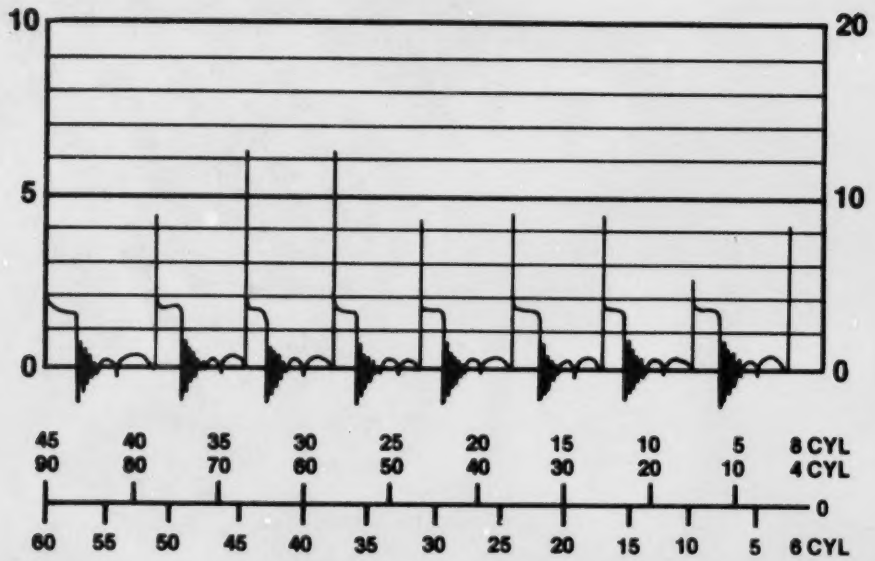
36. The following display pattern is shown on the engine analyzer, with the 20KV scale selected:



You should now:

a. Replace the spark plug to the #3 cylinder (go to #75)
b. Replace the spark plug wire to the #3 cylinder (go to #106)
c. Check spark plug wires to #3 and #4 cylinders (go to #24)
d. Check spark plugs to #3 and #4 cylinders (go to #69)
e. Check distributor cap and rotor (go to #50)

37. The following display pattern is shown on the engine analyzer:



You would now:

a. Replace all secondary circuit wiring (go to #92)
b. Check secondary wiring resistance (go to #45)
c. Check the condition of the spark plugs (go to #97)
d. Check available coil secondary voltage output (go to #89)
e. Perform a spark plug firing voltage test (go to #100)

38. The proper procedure for the snap load test would be:

a. Quickly open and close engine throttle (go to #61)
b. Slowly open the engine throttle, then quickly release (go to #27)
c. Remove a spark plug wire, then open the throttle (go to #4)
d. Remove coil primary lead, then open the throttle (go to #40)
e. Snap off the coil-to-distributor high tension lead, and then accelerate the engine (go to #75)

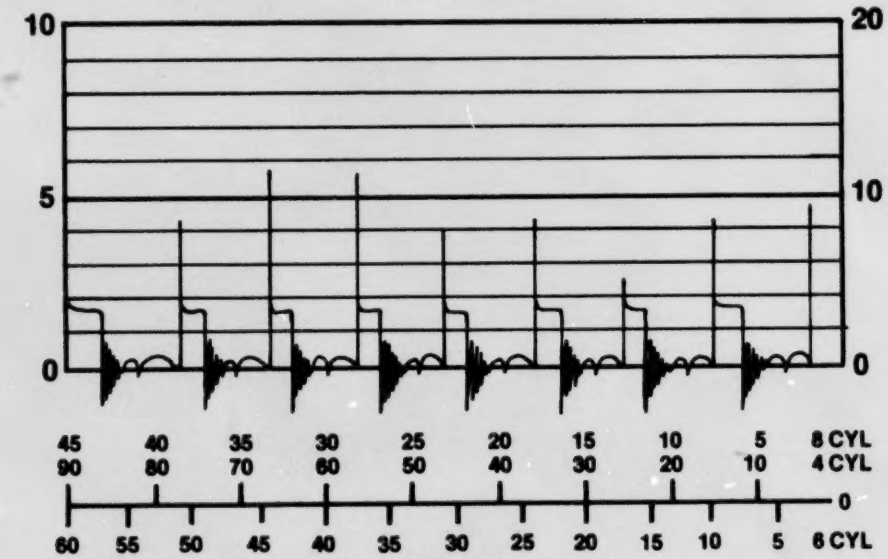
39. In order to check cylinder compression, you should first:

a. Remove battery ground cable clamp (go to #43)
b. Ground coil positive primary lead (go to #43)
c. Remove spark plugs from all cylinders (go to #43)
d. Remove spark plug from first cylinder to be tested (go to #43)
e. Install TDC indicator on distributor shaft (go to #43)

40. Which of the following conditions could be responsible for all the symptoms described in question #1?

a. Reversed coil polarity (go to #115)
b. Condenser with excessive capacity (go to #115)
c. Fuel starvation (go to #115)
d. Low compression because of worn rings (go to #115)
e. Defective secondary wiring (go to #115)
f. Improper ignition dwell angle (go to #115)
g. Shorted or defective battery (go to #115)

41. The following display pattern is shown on the engine analyzer, with the 20KV scale selected:



You should now:

a. Check the spark plug in the #7 cylinder (go to #105)
b. Check the spark plug wire to the #7 cylinder (go to #48)
c. Check the condition of all spark plugs (go to #73)
d. Check all secondary wiring (go to #45)

42. No pattern is obtained on the engine analyzer. You should now:

a. Replace all secondary circuit wiring (go to #92)
b. Check the condition of the spark plugs (go to #73)
c. Check the scope manufacturer's directions for checking ignition system (go to #57)
d. Perform a snap load test (go to #38)
e. Check contact point dwell (go to #76)
f. Repeat test, using raster pattern (go to #40)

43. Before each spark plug is removed, you should:

a. Check the torque required to loosen the plug from its seat (go to #111)
b. Clean the area around the spark plug seat with compressed air (go to #111)
c. Crank engine until #1 cylinder is at TDC (go to #111)

44. A good practice to follow whenever replacing ignition contact points is to also replace the:

a. Distributor cap (go to #40)
b. Secondary wiring (go to #64)
c. Primary wiring (go to #3)
d. Condenser (go to #102)
e. Coil (go to #75)

45. Specifications for this particular vehicle are not in the technical service manual. Resistance of secondary wiring is as follows:

WIRE:	#1 Spark plug	#2 Spark plug	#3 Spark plug	#4 Spark plug	#5 Spark plug
LENGTH: (in inches)	20	20	24	24	28
RESISTANCE: (in ohms)	7,000	7,000	variable*	variable*	8,000

WIRE:	#6 Spark plug	#7 Spark plug	#8 Spark plug	Coil-to-distributor cable
LENGTH: (in inches)	28	32	32	8
RESISTANCE: (in ohms)	10,000	9,000	10,000	4,000

* Measured from 8,000 to infinity, as wire was twisted.

You would now:

a. Replace spark plug wires #3 and #4 (go to #112)
b. Replace all secondary wires (go to #92)
c. Check condition of all spark plugs (go to #73)
d. Replace coil (go to #75)
e. Check contact point dwell (go to #76)

46. No pattern is obtained on the engine analyzer. You should now:

a. Repeat test, using superimposed pattern (go to #75)
b. Replace all secondary circuit wiring (go to #3)
c. Check contact point dwell (go to #102)
d. Check scope manufacturer's directions for testing ignition system (go to #57)

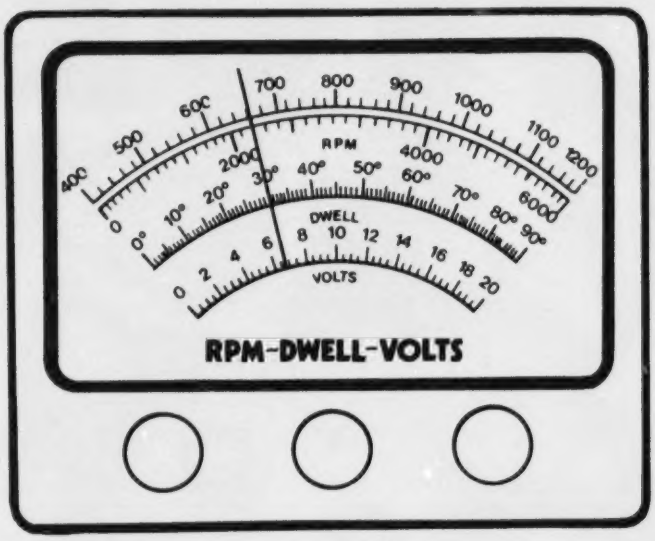
47. Before attaching the cylinder leakage air hose to any cylinder, you must first make sure that the piston in that cylinder is at:

a. 7 1/2° BTDC (go to #102)
b. TDC (go to #28)
c. BDC (go to #28)

48. Spark plug wire #7 is 32 inches in length. Measured resistance is 9,000 ohms. You would now:

a. Replace the wire with a new one (go to #112)
b. Install the old wire and check the resistance of the remaining spark plug wires (go to #45)
c. Install the old wire, and check contact point dwell (go to #76)
d. Install the old wire, and check distributor cap and rotor (go to #64)

49. Contact point dwell measures as shown below:



DWELL METER

Specifications for this engine are 28.5-32.5 degrees at specified RPM.

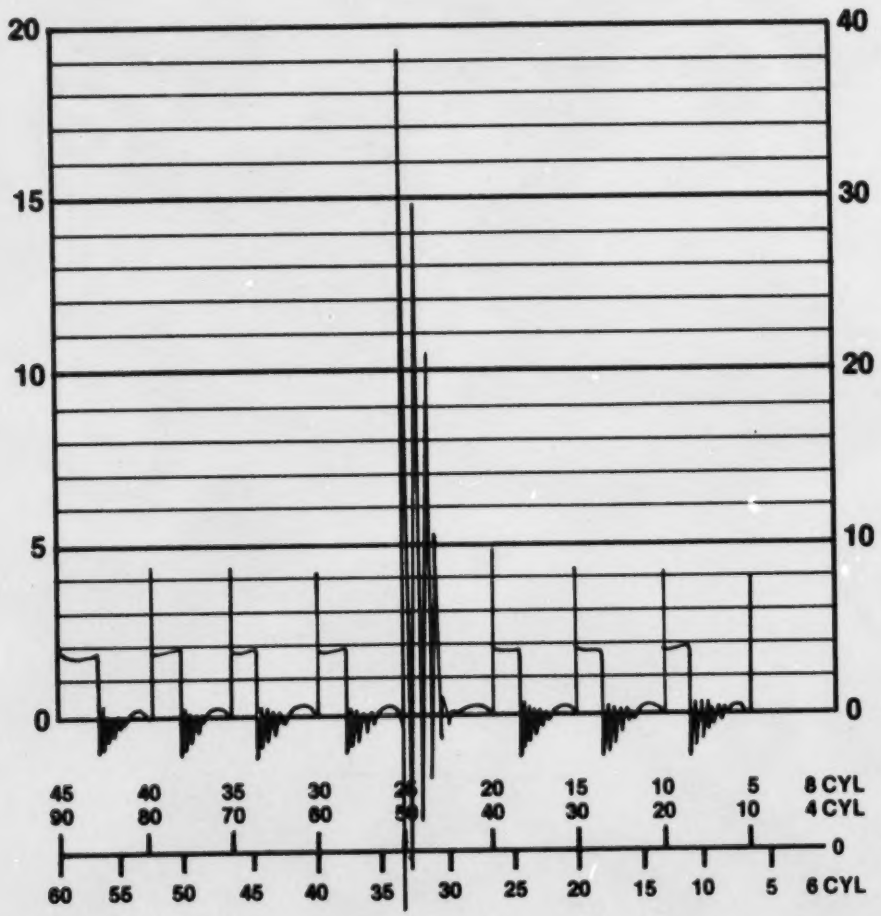
You would now:

a. Adjust dwell to specifications (go to #75)
b. Perform a cylinder compression test (go to #110)
c. Check condition of spark plugs (go to #15)
d. Perform a cylinder leakage test (go to #47)
e. Perform a cylinder power balance test (go to #107)
f. Tell the customer that his/her car is ready to go (go to #64)

50. The distributor cap is dirty, but terminals are not corroded or worn. Rotor is in good condition. You should now:

a. Replace the distributor cap and rotor (go to #70)
b. Check the contact point dwell (go to #76)
c. Check the available coil secondary voltage (go to #79)
d. Check the secondary wiring (go to #82)
e. Perform a secondary circuit insulation test (go to #13)

51. On the engine analyzer, the following display pattern is shown with spark plug wire #6 pulled:



You would now:

a. Replace the coil (go to #5)
b. Check available coil secondary output (go to #85)
c. Perform a spark plug firing voltage test (go to #100)
d. Replace the distributor cap and rotor (go to #70)

52. After testing for cylinder leakage, you check your results:

CYLINDER	1	2	3	4	5	6	7	8
PERCENTAGE OF LEAKAGE	24	15	20	32	12	21	38	26
AIR ESCAPING	tail pipe	none	none	tail pipe	none	tail pipe	tail pipe	tail pipe

These results indicate:

a. A blown head gasket (go to #80)
b. A cracked manifold (go to #80)
c. Leaky intake valves (go to #80)
d. Leaky exhaust valves (go to #80)
e. Worn piston rings (go to #80)
f. No mechanical problems in the engine (go to #80)
g. A crack in the engine block (go to #80)

53. Once you have removed the distributor cap, you would:

a. Select a secondary display pattern on the analyzer (go to #25)
b. Select a secondary raster pattern on the analyzer (go to #46)
c. Select a secondary superimposed pattern on the analyzer (go to #42)

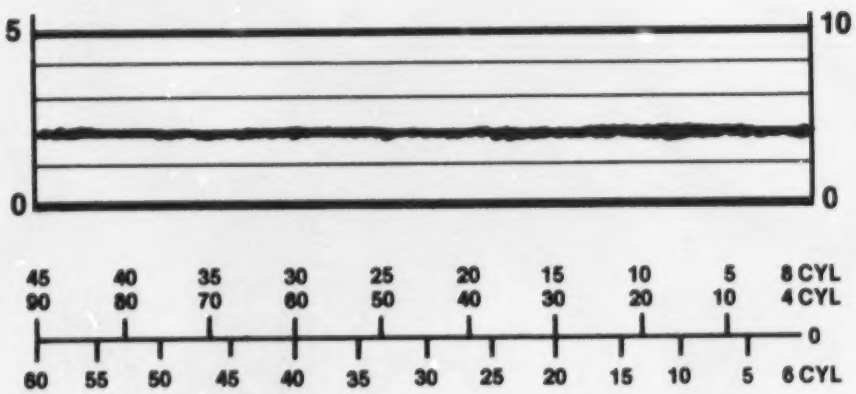
54. The spark plug specifications for a 1972 Chrysler Newport are as follows:

Gap: .035"
Torque: 30 ft-lbs.

A gap specification of .035" means that:

a. The dwell angle should also be 35 degrees (go to #75)
b. A feeler gauge of .035" thickness should fit loosely between the electrodes (go to #8)
c. A feeler gauge of .035" thickness should fit snugly between the electrodes (go to #60)
d. A feeler gauge of .040" thickness should barely fit between the electrodes (go to #3)

55. The following display pattern is shown on the engine analyzer.



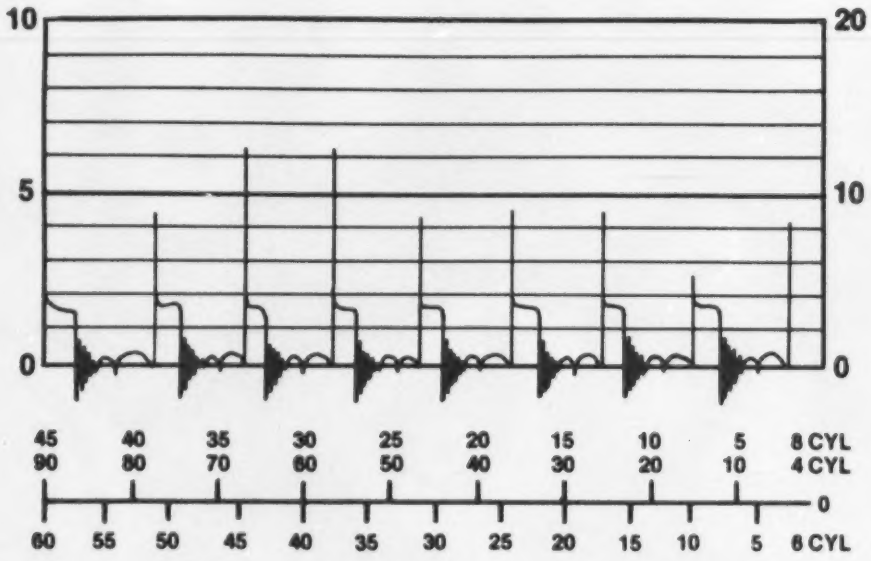
You would next:

a. Check the coil polarity (go to #30)
b. Replace the secondary wiring (go to #92)
c. Check the resistance of the distributor-to-coil high tension lead (go to #14)
d. Remove and ground a spark plug wire, and repeat test (go to #3)
e. Check condition of contact points (go to #66)

56. No drain on battery is detected. This means you would next:

a. Crank the engine (go to #29)
b. Hook up engine analyzer (go to #20)
c. Replace the battery (go to #40)
d. Charge the battery (go to #75)
e. Check the secondary wiring (go to #82)
f. Check the contact points (go to #66)
g. Visually inspect the engine compartment (go to #33)

57. After properly conducting a secondary circuit insulation test, you obtain the following pattern on the scope screen:



You would now:

a. Perform a spark plug firing voltage test (go to #100)
b. Check available coil secondary voltage output (go to #89)
c. Check the condition of the spark plugs (go to #97)
d. Check secondary wiring resistance (go to #45)
e. Replace all secondary circuit wiring (go to #92) .

58. After testing all cylinders in the leakage test, your results are:

CYLINDER	1	2	3	4	5	6	7	8
PERCENTAGE OF LEAKAGE	24	15	20	32	12	21	28	26
AIR ESCAPING	tail pipe	none	none	tail pipe	none	tail pipe	tail pipe	tail pipe

These results indicate:

a. A crack in the engine block (go to #80)
b. No mechanical problems in the engine (go to #80)
c. Worn piston rings (go to #80)
d. Leaky exhaust valves (go to #80)
e. Leaky intake valves (go to #80)
f. A cracked manifold (go to #80)
g. A blown head gasket (go to #80)

25

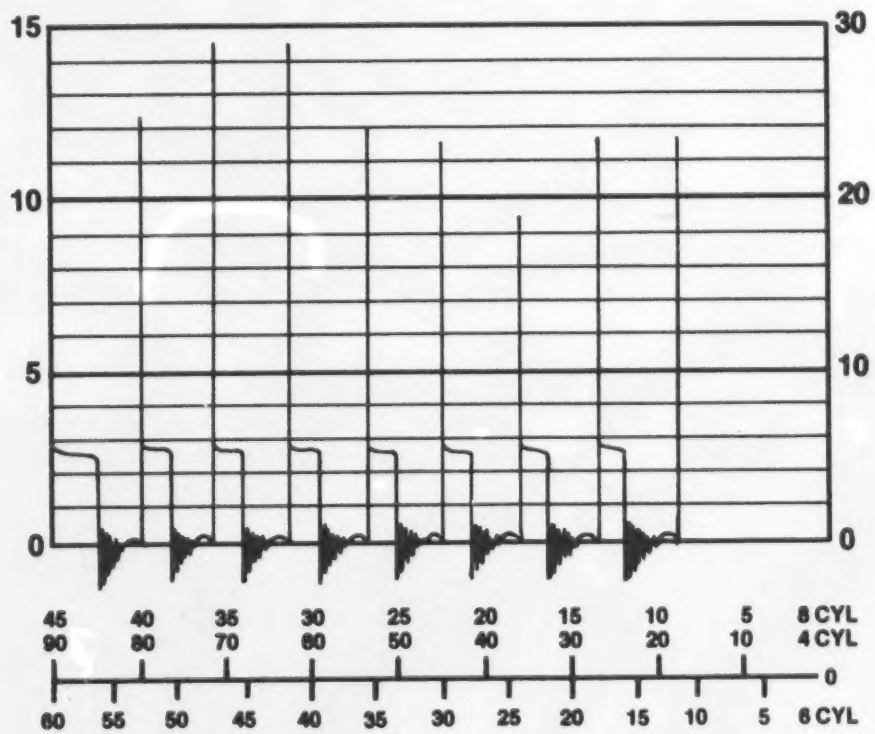
59. A recommended method for using a solvent solution to clean spark plugs is:

a. Give the spark plug an air blast, soak in the solvent solution, and then install (go to #84)
b. Soak the spark plug in the solvent solution and dry it with compressed air (go to #84)
c. Soak the spark plug in the solvent solution and give it an abrasive particle blast (go to #84)

60. When installing new spark plugs, you remember to torque the plugs to specifications. Your torque wrench is 18 inches long (1 1/2 feet), and manufacturer specifies a torque of 30 ft-lbs. Therefore, you would tighten the spark plugs until the torque gauge reads:

a. 15 ft-lbs. (go to #2)
b. 20 ft-lbs. (go to #2)
c. 30 ft-lbs. (go to #2)
d. 45 ft-lbs. (go to #22)

61. On the engine analyzer, you obtain the following secondary display pattern:



You would now:

a. Check secondary circuit resistance (go to #32)
b. Check spark plug #7 for fouling (go to #105)
c. Check spark plug wire #7 for excessive resistance (go to #48)
d. Check spark plug #4 for fouling (go to #78)
e. Check spark plug wire #4 for excessive resistance (go to #88)
f. Check distributor cap and rotor (go to #50)

62. After checking compression on all cylinders, the readings are:

CYLINDER	1	2	3	4	5	6	7	8
COMPRESSION (in pounds)	65	75	65	55	80	60	50	60

Manufacturer specifies compression of 100 pounds, with 40 pounds variation. Now you should:

a. Perform a cylinder leakage test (go to #47)
b. Perform the "wet" compression test procedure (go to #18)
c. Inform the customer that his/her car needs an engine overhaul (go to #102)
d. Disable the ignition, and repeat test (go to #3)

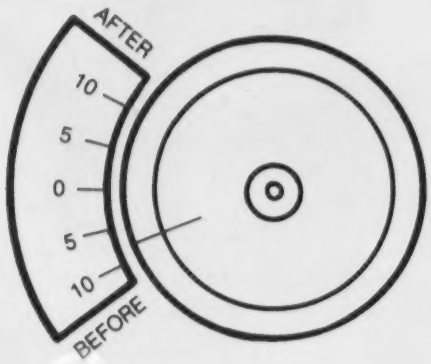
63. One recommended method for using an abrasive type of spark plug cleaner is to:

a. Give the plug one blast with the abrasive particles, then one air blast (go to #54)
b. Rotate the plug in the fixture while giving it first an air blast, and then an abrasive particle blast (go to #54)
c. Hold the plug steady in the fixture and give it an abrasive particle blast (go to #54)
d. Rotate the plug in the fixture while giving it first an abrasive particle blast, then an air blast (go to #54)

64. Whenever symptoms like those described in question 1 occur, the first part(s) of the vehicle you should check is:

a. The fuel pump and carburetor (go to #115)
b. The valves and rings (go to #115)
c. The battery and cables (go to #115)
d. The charging circuit (go to #115)
e. The cranking motor (go to #115)
f. The ignition system (go to #115)
g. The emission control devices (go to #115)

65. Ignition spark timing specifications for this vehicle are given by the manufacturer as 7 1/2° BTDC, at specified RPM. The actual timing is pictured below:



You would now:

a. Perform a cylinder power balance test (go to #74)
b. Adjust contact point dwell (go to #75)
c. Perform snap load test (go to #38)
d. Retard the spark timing (go to #64)
e. Advance the spark timing (go to #3)

66. After removing the distributor cap and rotor, you visually inspect contact points. Points look good, no pitting is present, and spring tension in points seems okay. Next you would:

a. Crank the engine to see if points open and close properly (go to #94)
b. Check the point gap (go to #11)
c. Check the point dwell (go to #76)
d. Check the secondary wiring (go to #82)
e. Hook up engine analyzer (go to #20)
f. Check cylinder compression (go to #39)

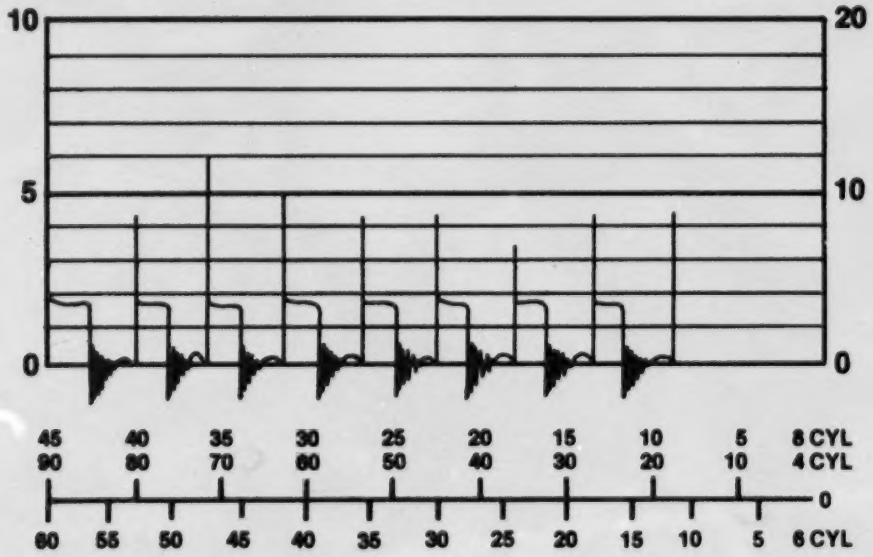
67. Results of cylinder power balance test are (at 800 RPM idle):

CYLINDER	1	2	3	4	5	6	7	8
LOW RPM	750	720	780	780	720	740	780	750

You would now:

a. Check ignition circuit with engine analyzer (go to #20)
b. Perform a cylinder compression test (go to #39)
c. Perform a cylinder leakage test (go to #6)
d. Stop: the engine is running fine (go to #3)
e. Tell the customer that his/her car needs an engine overhaul (go to #102)

68. The following pattern is shown on the engine analyzer, with the 20KV scale selected:



You should now:

a. Replace the spark plug wire to cylinder #4 (go to #88)
b. Check the condition of all the spark plug wires (go to #31)
c. Check the spark plug to #4 cylinder (go to #78)
d. Repeat test, grounding the wire that leads to #3 cylinder (go to #36)
e. Check condition of all spark plugs (go to #73)

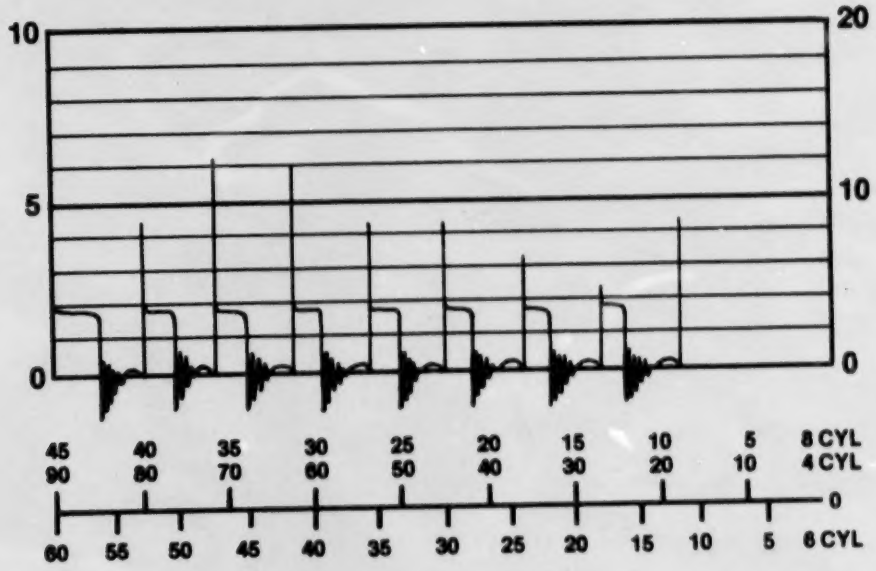
69. Spark plugs to cylinders #3 and #4 are covered with a thin gray coating, and show some wear. You would next:

a. Replace the two spark plugs with new ones of lower heat range (go to #75)
b. Replace the two spark plugs with new ones of higher heat range (go to #3)
c. Replace the two spark plugs with new ones of the same heat range (go to #84)
d. Reinstall the spark plugs after cleaning and gapping them (go to #54)
e. Check the rest of the spark plugs (go to #73)

70. After replacing the distributor cap and rotor, you should next:

a. Check the secondary wiring (go to #82)
b. Perform a secondary circuit insulation test (go to #13)
c. Perform a spark plug firing voltage test (go to #100)
d. Check coil polarity (go to #75)
e. Check available coil secondary voltage output (go to #79)

71. On the engine analyzer, the following display pattern is shown (spark plug wire #2 removed):



You would next:

a. Replace the coil (go to #5)
b. Check coil primary and secondary resistance (go to #26)
c. Check the secondary wiring (go to #82)
d. Check cylinder power balance (go to #74)
e. Perform a snap load test (go to #61)

72. After checking compression on all cylinders, the readings look like this:

CYLINDER	1	2	3	4	5	6	7	8
COMPRESSION (in pounds)	65	75	65	55	80	60	50	60

Manufacturer specifies compression of 100 pounds with 40 pounds variation.

a. Inform the customer that his/her car needs an engine overhaul (go to #40)
b. Perform a cylinder power balance test (go to #74)
c. Perform a cylinder leakage test (go to #6)
d. Perform the wet compression test procedure (go to #91)

73. After removing all spark plugs, you note that the rest of the plugs are covered with a thin, gray coating, except for #7 spark plug, which is very fouled and corroded. No plugs have any cracks in the insulators, yet all show some signs of wear.

You would now:

a. Install new spark plugs of the same heat range (go to #84)
b. Install new spark plugs of higher heat range (go to #54)
c. Install new spark plugs of lower heat range (go to #84)
d. Reinstall old spark plugs after cleaning and gapping them (go to #63)
e. Replace old spark plug #7, and reinstall others after cleaning and gapping them (go to #59)

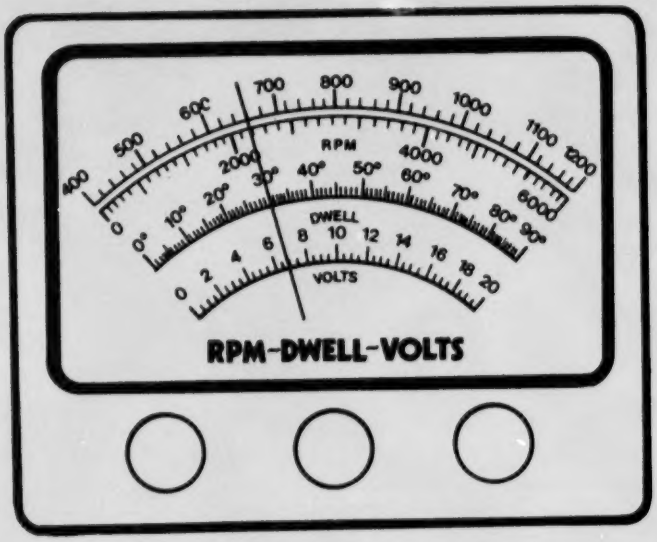
74. The cylinder power balance test is most easily performed by using:

a. A portable compression gauge (go to #40)
b. A portable tachometer and spark plug hookup adapters (go to #67)
c. A timing light and dwell meter (go to #75)
d. An engine analyzer (go to #19)

75. Which of the following conditions would be least likely to produce the symptoms described in question 1?

a. Fouled spark plugs (go to #115)
b. Worn valves (go to #115)
c. Fuel starvation (go to #115)
d. Defective secondary wiring (go to #115)
e. Improper ignition spark timing (go to #115)
f. Cracked distributor cap (go to #115)
g. Reversed coil polarity (go to #115)

76. After hooking up dwell meter, you start engine and obtain the following reading:



DWELL METER

The manufacturer specified a contact point dwell period of 28.5-32.5 degrees. You would now:

a. Adjust dwell as specified (go to #34)
b. Check cylinder compression (go to #39)
c. Check the secondary wiring (go to #82)
d. Test the condenser (go to #86)
e. Hook up engine analyzer (go to #20)
f. Visually inspect the engine compartment (go to #33)

77. High discharge test results show a battery voltage of 9.9 v after the test. You would now:

a. Replace the battery (go to #40)
b. Charge the battery (go to #75)
c. Visually inspect the engine compartment (go to #33)
d. Crank the engine (go to #29)
e. Check the secondary wiring (go to #82)
f. Hook up engine analyzer (go to #20)

78. After removing #4 spark plug, you note that the plug is somewhat worn, but not fouled or corroded. The gap is also okay. Now you should:

a. Replace the spark plug with a new one (go to #84)
b. Install the old spark plug (go to #54)
c. Check the spark plug wire resistance (go to #88)
d. Check the condition of the remaining spark plugs (go to #73)

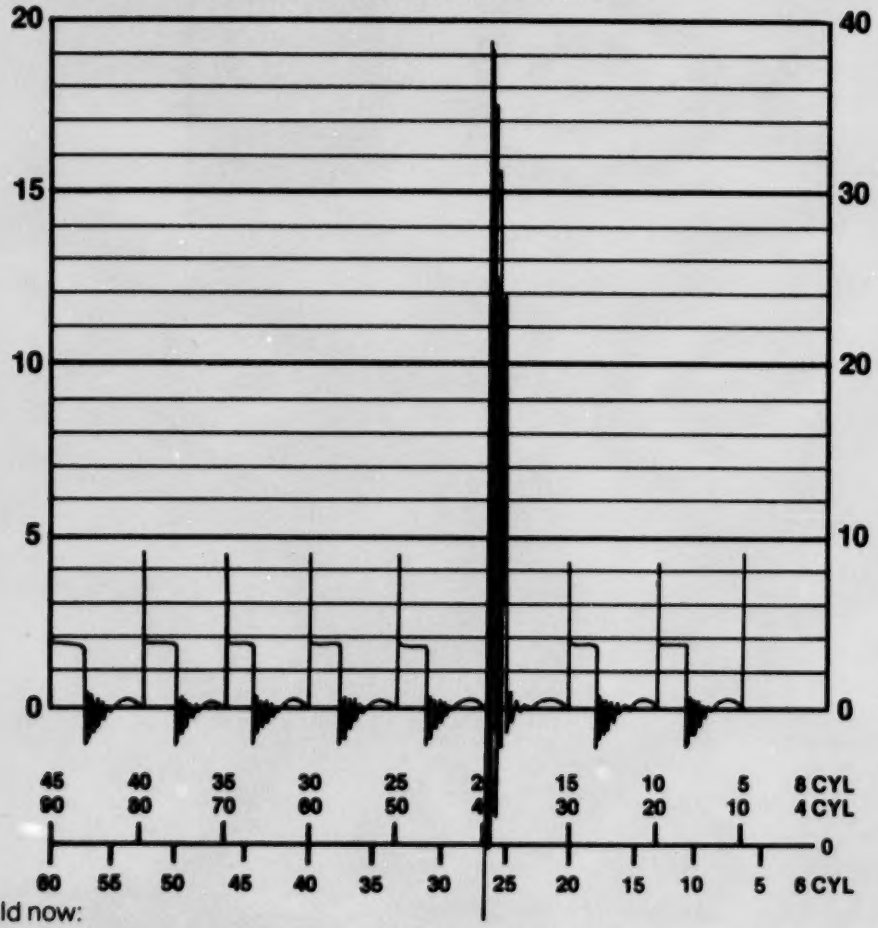
79. In order to make an available coil voltage (secondary) test, you need to:

a. Remove distributor cap (go to #53)
b. Remove coil secondary lead from distributor cap (go to #108)
c. Remove and ground a spark plug wire (go to #71)
d. Remove a spark plug wire (go to #89)

80. The proper procedure for checking your work after working on an automobile engine would be to:

a. Crank the engine and listen for noises (go to #115)
b. Check the engine, using the engine analyzer (go to #115)
c. Perform a cylinder compression test (go to #115)
d. Perform a cylinder leakage test (go to #115)
e. Perform a cylinder power balance test (go to #115)

81. On the engine analyzer, the following display pattern is shown:



You would now:

a. Repeat the test, pulling other spark plug wires (go to #51)
b. Replace the secondary ignition wires (go to #92)
c. Replace the coil (go to #5)
d. Check the coil polarity (go to #30)
e. Perform a cylinder compression test (go to #39)

33

82. Secondary wiring connections are all tight, and wires are in fair condition externally. Next you would:

a. Check contact point dwell (go to #76)
b. Check cylinder compression (go to #39)
c. Check secondary wiring resistance (go to #45)
d. Crank the engine (go to #29)
e. Check the battery (go to #21)

83. The results of the wet compression test readings are:

CYLINDER	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
COMPRESSION (in pounds)	65	75	65	55	80	60	50	60

These results indicate that:

a. There is no mechanical fault in the engine (go to #75)
b. Proper air flow in the intake manifold is being restricted or blocked (go to #64)
c. The valves are worn (go to #95)
d. The cylinder walls are worn thin (go to #3)
e. The piston rings have excessive wear (go to #102)
f. The spark timing is not properly set (go to #40)

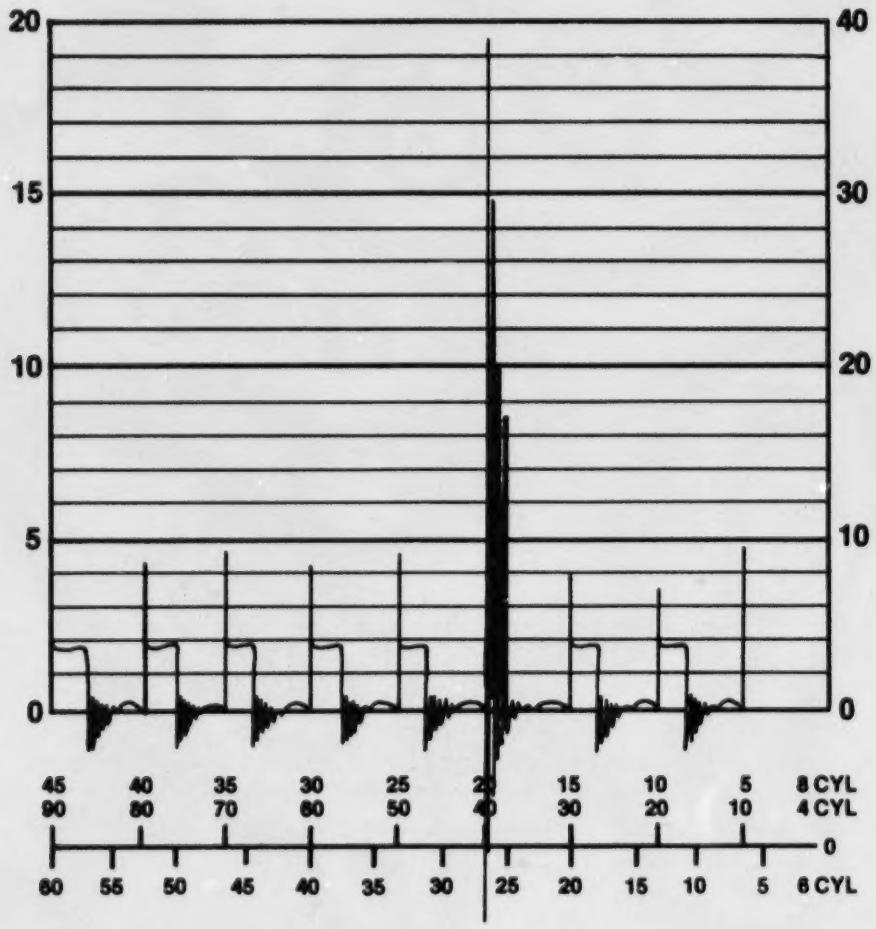
84. The spark plug specifications for a 1972 Chrysler Newport are as follows:

Gap: .035"
Torque: 30 ft-lbs.

A gap specification of .035" means that:

a. A feeler gauge of .040" thickness should barely fit between the electrodes (go to #3)
b. A feeler gauge of .035" thickness should fit snugly between the electrodes (go to #60)
c. A feeler gauge of .035" thickness should fit loosely between the electrodes (go to #8)
d. The dwell angle should also be 35 degrees (go to #75)

85. The following display pattern is shown on the engine analyzer:



You should now:

a. Perform a snap load test (go to #61)
b. Check contact point dwell (go to #76)
c. Check the secondary wiring (go to #82)
d. Check the condition of the spark plugs (go to #73)
e. Perform a cylinder power balance test (go to #74)

86. Condenser test shows no leakage or short. Next you would:

a. Check ignition spark timing (go to #96)
b. Replace condenser with a new one (go to #3)
c. Check cylinder compression (go to #39)
d. Check the battery (go to #21)
e. Hook up engine analyzer and scope (go to #20)
f. Check the secondary wiring (go to #82)

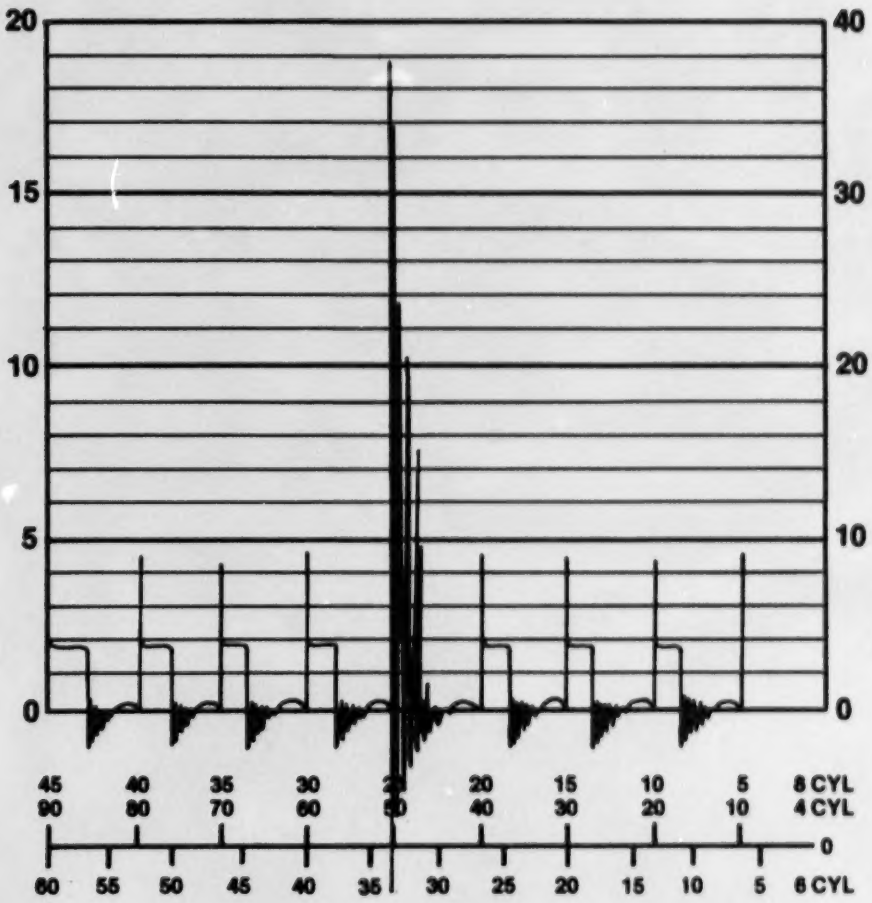
87. Which of the following test procedures can indicate whether the problem was in the intake valves, exhaust valves, or both?

a. A cylinder leakage test (go to #6)
b. A cylinder power balance test (go to #75)
c. A dry compression test (go to #3)
d. A spark plug firing voltage test (go to #102)

88. Spark plug wire #4 is 24 inches in length. Measured resistance changes from 8,000 ohms to infinite ohms and back again, as you twist the wire. You should next:

a. Replace the spark plug wire with a new one (go to #112)
b. Check the condition of the remaining spark plug wires (go to #45)
c. Install the old spark plug wire (go to #64)
d. Check coil polarity (go to #40)

89. On the engine analyzer, the following display pattern is shown:



You should next:

a. Check coil polarity (go to #30)
b. Make a snap load test (go to #38)
c. Make a secondary circuit insulation test (go to #13)
d. Check coil primary and secondary resistance (go to #26)
e. Check dwell (go to #76)
f. Make a cylinder compression test (go to #39)

90. After properly hooking up the engine analyzer, the next step would be to:

a. Short out cylinders, one at a time, and note engine RPM increase (go to #99)
b. Short out cylinders, one at a time, and note engine RPM decrease (go to #99)
c. Short out all cylinders, one at a time, and note spark timing change (go to #75)

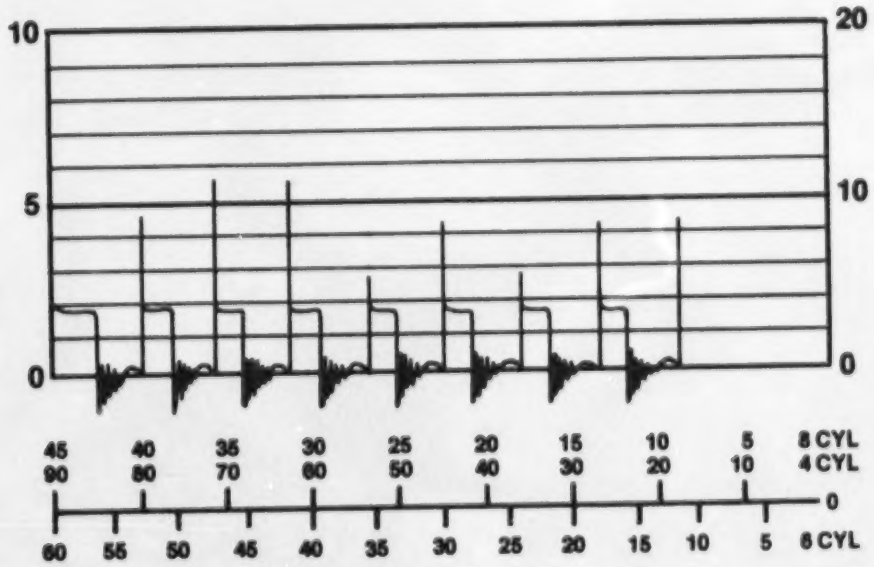
91. In order to perform the wet compression test procedure, you need to:

a. Squirt about 2 ounces of water into a cylinder, and then take the compression reading (go to #40)
b. Squirt about 2 ounces of gasoline into a cylinder, and then take the compression reading (go to #75)
c. Squirt about 2 ounces of motor oil into a cylinder, and then take the compression reading (go to #35)
d. Squirt about 2 ounces of solvent into a cylinder, and then take the compression reading (go to #102)

92. After replacing the secondary wiring, you should:

a. Check cylinder power balance (go to #107)
b. Crank the engine (go to #12)
c. Check distributor cap and rotor (go to #17)
d. Check contact point dwell (go to #76)
e. Check condition of all spark plugs (go to #73)
f. Check ignition spark timing (go to #65)
g. Check engine operation with scope (go to #114)

93. The following display pattern is shown on the engine analyzer, with the 20KV scale selected:



You should now:

a. Replace the spark plug to the #6 cylinder (go to #102)
b. Replace the spark plug wire to the #6 cylinder (go to #3)
c. Check compression in #6 cylinder (go to #64)
d. Check distributor cap and rotor (go to #50)
e. Repeat test, grounding wire to #7 cylinder (go to #41)

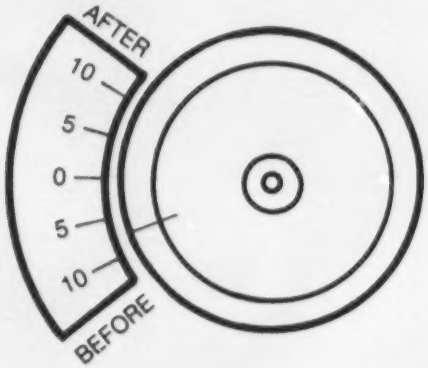
94. When engine is cranked, contact points open and close smoothly, and spark appears between points as they open. Next you would:

a. Replace the points because they are arcing (go to #44)
b. Increase the point gap (go to #109)
c. Check point dwell (go to #76)
d. Check the distributor cap and rotor for cracks (go to #50)
e. Inspect the secondary wiring (go to #82)

95. Which of the following test procedures could pinpoint the problem as intake valves, exhaust valves, or both?

a. A spark plug firing voltage test (go to #75)
b. A dry compression test (go to #102)
c. A cylinder power balance test (go to #40)
d. A cylinder leakage test (go to #47)

96. Manufacturer's specifications for ignition spark timing are 7 1/2° BTDC at specified RPM. Actual timing is pictured below:



You would now:

a. Advance the spark timing (go to #3)
b. Retard the spark timing (go to #102)
c. Hook up the engine analyzer (go to #20)
d. Adjust contact point dwell (go to #75)
e. Perform a cylinder power balance test (go to #74)

97. After removing spark plug wire and the #1 spark plug, you note that the firing tip of the plug is covered with a thin, gray coating. The ground and side electrodes look okay. Now you would:

a. Select a set of plugs of higher heat range for the car (go to #84)
b. Select a set of plugs of lower heat range for the car (go to #54)
c. Check the condition of the remaining spark plugs (go to #73)
d. Install the plug, and check the contact points (go to #66)

98. Before cranking the engine for the compression test, you should:

a. Remove the air cleaner and block the throttle wide open (go to #72)
b. Remove the air cleaner and block the throttle shut (go to #75)
c. Remove the air cleaner and block the automatic choke shut (go to #64)
d. Remove the air cleaner and block the transmission throttle linkage (go to #3)

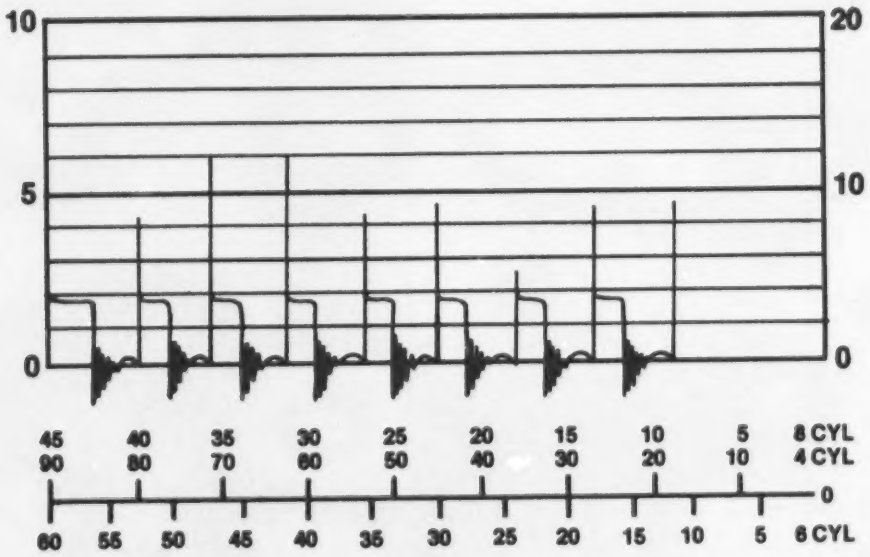
99. Results of cylinder power balance test (at 800 RPM idle) are:

CYLINDER	1	2	3	4	5	6	7	8
LOW RPM	750	720	780	780	720	740	780	750

You would next:

a. Check condition of all spark plugs (go to #15)
b. Stop: the engine is operating well (go to #102)
c. Perform a cylinder compression test (go to #110)
d. Tell the customer that his/her car needs an engine overhaul (go to #47)
e. Perform a cylinder leakage test (go to #3)

100. On the engine analyzer, you obtain the following secondary display pattern:



You would now:

a. Remove plug wire #2, and repeat test (go to #16)
b. Remove plug wire #3, and repeat test (go to #36)
c. Remove plug wire #6, and repeat test (go to #93)
d. Remove plug wire #7, and repeat test (go to #41)

101. Battery case, terminals, and clamps are now clean, and clamps are tight. You should now:

a. Check battery capacity (go to #77)
b. Crank the engine (go to #29)
c. Check cylinder compression (go to #39)
d. Hook up engine analyzer (go to #20)
e. Check for battery drain (go to #56)
f. Check the secondary wiring (go to #82)

102. Which of the following tests could quickly help you detect whether a problem exists in the primary ignition circuit?

a. Spark intensity test at the coil (go to #115)
b. Cylinder power balance test (go to #115)
c. Spark plug firing voltage test (go to #115)
d. Secondary circuit insulation test (go to #115)
e. Cylinder leakage test (go to #115)
f. Check of ignition spark timing (go to #115)

103. Resistance of spark plug wires to cylinders #3 and #4 is variable, depending on how the wires are twisted. You would now:

a. Reinstall the spark plug wires, and check the spark plugs (go to #102)
b. Check the remaining secondary wiring (go to #31)
c. Replace the spark plug wires to cylinders #3 and #4 (go to #113)
d. Inspect the distributor cap and rotor (go to #64)

104. The simplest method for ensuring that pistons in other cylinders (after testing #1 cylinder) are in proper position is:

a. To use the air whistle for each remaining cylinder (go to #52)
b. To refer to the TDC indication indicator position (go to #52)
c. To refer to the timing marks on or near the harmonic balancer (go to #52)
d. To measure piston position with a screwdriver blade (go to #52)

105. After removing #7 spark plug, you note that the plug is badly fouled. You would now:

a. Replace the spark plug with a new one of the same heat range (go to #84)
b. Check the condition of all spark plugs (go to #73)
c. Clean the old spark plug, gap it, and reinstall it (go to #84)
d. Install a new plug of higher heat range (go to #84)

106. After replacing the spark plug wire to the #3 cylinder, you would:

a. Repeat the test on #2 cylinder (go to #40)
b. Repeat the test on #4 cylinder (go to #68)
c. Repeat the test on #7 cylinder (go to #41)
d. Check the distributor cap and rotor (go to #50)

107. The cylinder power balance test is most easily performed by using:

a. The engine analyzer (go to #90)
b. A timing light and dwell meter (go to #3)
c. A portable tachometer and spark plug hookup adapters (go to #99)
d. A portable compression gauge (go to #102)

108. After removing coil secondary lead from distributor cap, you would:

a. Select a secondary superimposed pattern on the analyzer (go to #42)
b. Select a secondary display pattern on the analyzer (go to #25)
c. Select a secondary raster pattern on the analyzer (go to #46)

109. Increasing the ignition contact point gap also serves to:

a. Advance the spark timing (go to #40)
b. Retard the spark timing (go to #40)
c. Increase spark plug firing voltage (go to #40)
d. Decrease spark plug firing voltage (go to #40)

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110. Before cranking the engine for a cylinder compression test, you should make sure that:

a. The #1 cylinder is at TDC (go to #75)
b. All spark plugs are removed (go to #62)
c. Throttle valve is blocked shut (go to #40)
d. Fuel pump line is disconnected (go to #115)
e. Air cleaner is installed to prevent backfire (go to #64)

111. Before you install the compression gauge, or crank the engine, you would next:

a. Test the condenser (go to #98)
b. Check spark timing (go to #98)
c. Check contact point dwell (go to #98)
d. Disable the ignition system (go to #98)

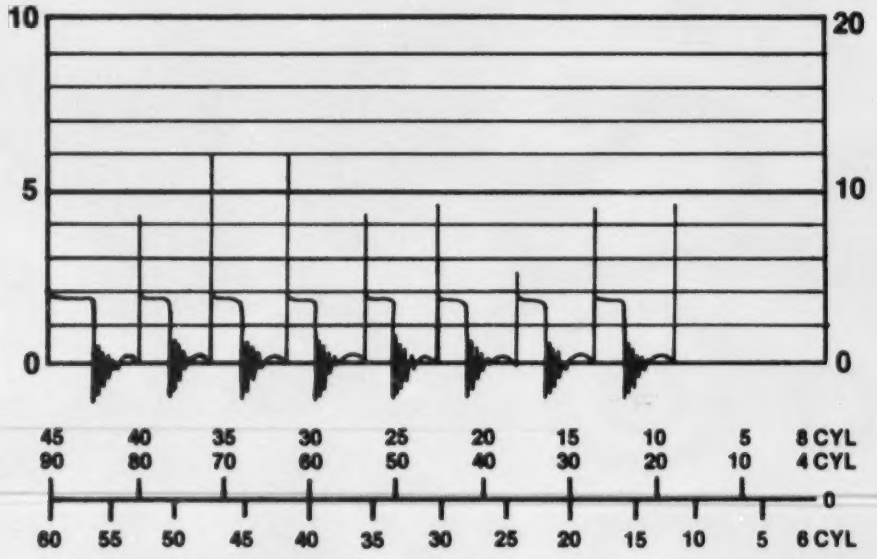
112. After replacing the spark plug wires, you would next:

a. Check condition of all spark plugs (go to #73)
b. Check contact point dwell (go to #76)
c. Check distributor cap and rotor (go to #17)
d. Check cylinder power balance (go to #107)
e. Check engine operation with scope (go to #114)

113. After replacing the spark plug wires, you should next:

a. Check cylinder power balance (go to #107)
b. Crank the engine (go to #12)
c. Check distributor cap and rotor (go to #17)
d. Check contact point dwell (go to #49)
e. Check condition of all spark plugs (go to #15)

114. The following display pattern is obtained:



You would next check the:

a. Cylinder power balance (go to #107)
b. Distributor cap and rotor (go to #17)
c. Contact point dwell (go to #76)
d. Condition of all spark plugs (go to #73)

115. STOP. You have completed this activity. Give this test and your answer sheet to your instructor.